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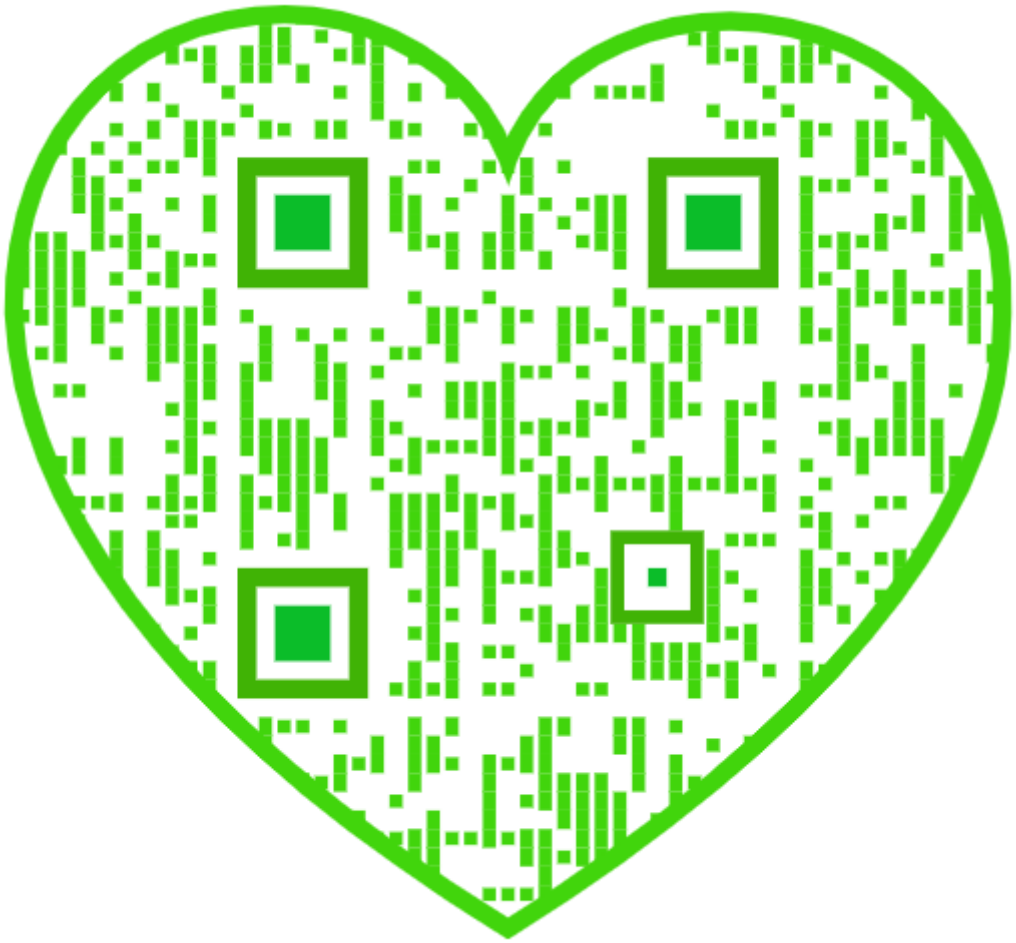

Design and Color in
Printing

Design and Color in Printing

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Chicago:
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Appropriate Type-faces

The man who has the eye and intellect will invent beautiful proportions, and can not help it; but he can not tell us how to do it. There are one or two general laws that can be told; but they are of no use, indeed, except as preventatives of gross mistakes.— *John Ruskin.*

S the above quotation would indicate, it is not the intention or province of this series of articles to formulate or lay down rules which shall constitute an easy road to a knowledge of the artistic arrangement of type matter. No vest-pocket guide to the acquirement of a clear conception of the principles of design and color harmony as applied to the printed page will be attempted. It is not possible — neither is it desirable, for if it were possible the incentive to study and improvement would be eliminated. Imagine a few set and easily learned rules governing the painting of landscapes. Our interest in this form of pictorial art would soon die out. The same thing is true of printing. If by some mysterious short cut we could in a few brief lessons master all there is of art in printing, the craft would rapidly degenerate into the most commonplace of trades.

But, consciously or unconsciously, we must recognize the presence of these general laws in our work as printers. They are apparent in all good specimens. Much of the best and most pleasing printing of to-day

is done by craftsmen who invent beautiful proportions but can not tell how it is done. These men we say are endowed with an inherent sense of the fitness of things, or "good taste." This serves them well, but they can not impart it to others, and consequently the acquiring of this good taste by others must be assisted and expedited by a study of these certain principles even though they are useful only as preventives of gross mistakes. In this manner their study also assists the one who is possessed of inherent talent.

These principles of true art are found in the work that has endured throughout the centuries as the best — and the forms of typography which have endured have been the plain and simple ones. They are not found in any marked degree in the forms of typographical arrangement based on passing vogues or fads. A careful study of the "artistic" curved rule-work of a few years ago fails to reveal anything of an enduring nature or anything which would suggest its revival as a factor in printing. The same is true of the grotesque shaded letters now covered with a thick coating of dust in the older offices. The curved rule-work and the shaded letter, like many other passing fancies, were not based on the fundamental principles of true art, and hence were but short-lived.

One of the first things which the printer must consider is the choice of the letter for the work on which he is engaged. The author is careful to present his subject in appropriate and pleasing manner and the medium through which his ideas are conveyed to the public should certainly be such that a harmony is preserved between the two. There can be no iron-clad rules as to what may or what may not be done with regard to the use of certain type-faces for certain kinds

of work, but a few general laws — laws of custom — may assist us. The usage of centuries has established customs in regard to the type-faces that may be used

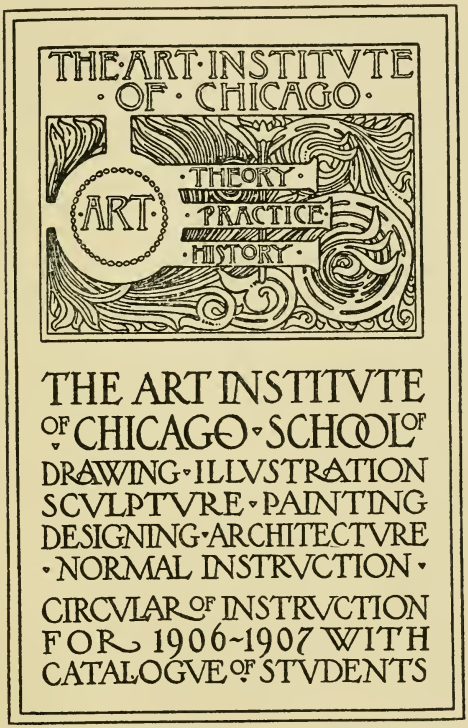

Fig. 1.— An appropriate and pleasing use of the formal roman capitals.

for certain classes of work, and in order to appreciate this historical significance of the use of these letters a brief consideration of them will be necessary.

Our type of to-day may be divided into four general classes, known in the modern printing-office as roman, text, italic, and gothic.

The roman capitals are practically the same in design as the lettering used by the Latin scribes in early manuscripts and by the ancient stonecutters for inscriptions on memorial arches, buildings, etc. From the nature of its shape and from the uses to which it was orginally put, the roman capital is necessarily a formal letter, and its most pleasing use is found in the composition of the cover or title-page of a formal piece of printing, such as a library catalogue, art institute catalogue, or work of this sort. The roman lower-case, which, until after the invention of printing, was of a more or less indefinite shape, was evolved, through the necessity of having for the bulk of the page a letter more legible and more easily executed than the roman capitals. A pleasing and appropriate use of the roman capitals is shown in Fig. 1.

The text-letter — historically called the gothic from the nature of its origin and its noticeable characteristics of the gothic form of architecture and decoration — has ever been the logical letter for ecclesiastical use. It is more informal and more decorative than the roman capital. Its appropriate use is well exemplified in Fig. 2.

The italic is said to have been designed after the handwriting of Petrarch, an Italian poet of the fourteenth century. The italic came into use with the desire for a letter which could be more easily and rapidly executed than could the roman. At first only

the lower-case italic was made, it being used in connection with roman capitals. The italic is informal and graceful, making an especially appropriate letter where the dignity of the roman is not required.

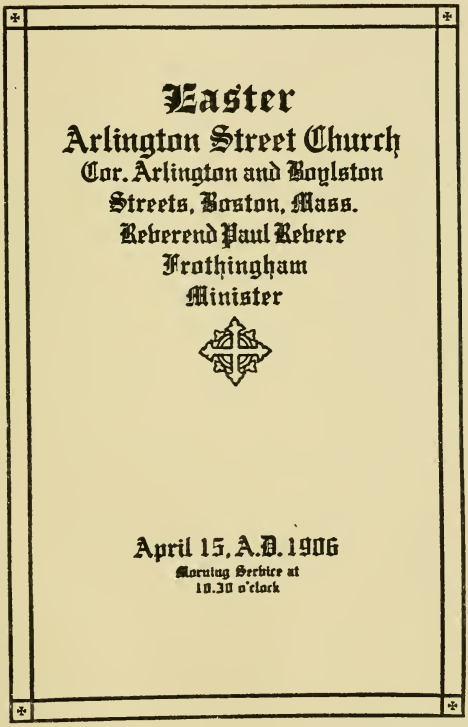

FIG. 2.— The text type is seen at its best in work of this class.

The block letter, known to the printer as gothic, is without serifs and the elements are all of equal width. It is distinctively utilitarian in its purpose, angular in design and possesses but little beauty. The gothic is particularly appropriate for use on business stationery, blanks, etc., but for title-pages, programs, etc., is usually not so pleasing or desirable as the roman or text.

It is by no means the intention to convey the idea that the usage of these different forms of letters should be confined to the classes of work herein suggested as the most appropriate. All of these faces are in daily use in commercial work of every description. A consideration of these letters in their most appropriate surroundings will, however, serve to assist us in attaining a clearer appreciation of what can rightfully be done with them when we remove them to the conditions of every-day work. When we consider the text-letter as an informal, decorative letter, gothic in design and peculiarly harmonizing with the gothic architecture and decoration found in connection with churches, we are hardly liable to employ it to any great extent in the stationery of a hardware house, and when we consider the lack of art and the predominance of the utility features in the square gothic (sans serif) type we will hardly use it in the commercial work of a firm dealing in stained-glass windows. Where a bit of decoration is desirable in commercial work a line of text is desirable, but when we use all text we have all decoration.

Association of Type-faces

In all association of lines whatsoever, it is desirable that there should be a reciprocal relation, and the eye is unhappy without perception of it.— *John Ruskin.*

OLLOWING the consideration of what letter is appropriate for the work to be done, comes the question of the harmonious association of type-faces — the question of which type-faces can be used together and which can not, and the reasons therefor. Everything considered, the results which are the most satisfactory are usually found in the printing in which the question of the association of type-faces does not enter — the printing in which but one series of type is used. We may even go a step farther and say that the most pleasing results are attained where the work is not only confined to one series, but is set in either all capitals or all lower-case of that series. Each forms a different band of design and the characteristics are distinctive. But this is not always possible. The design as a whole is more important than the shape of the individual letters used for the separate lines, and where the adhering to the use of capitals necessitates an unreasonable length of line which breaks the contour of the design as a whole, it is absurd to stick to the rule of all capitals or all lower-case. Neither could it be deemed advisable under all conditions to confine

the work to one series of type. The desirability of adding a bit of decoration, or emphasis, or a spot of a darker tone to a type-design often justifies the use of the second series; and it is not impossible to use three series pleasingly in the same job — for instance, Caslon, Caslon Italic and Caslon Text.

We are, however, rapidly coming to a better appreciation of the more simple and less involved type arrangements. The type catalogue which a few years ago contained six or seven hundred type-faces now contains but a third of that number. The printing-office which a few years ago contained a miscellaneous assortment of grotesque type-faces, one or two sizes only of each series, now contains well-filled and complete series of a few faces — and surely the improvement of the printing of to-day over that of ten years ago bears evidence of the desirability of the new order of things.

The most important factor in the consideration of the association of type-faces is that of shape harmony. "Shape harmony would imply that all the shapes in a piece of work must share some common property. For instance, curves and curvilinear figures would go well together, straight lines and rectangular figures would be classified in the same way. Thus if we would have complete shape harmony we would see that all the figures in a design were similar or at least governed by the same law."* Bearing in mind the admonition to see that all the figures in a type-design were similar, we will avoid the association of the graceful and flowing texts and romans with the angular block letter. "But," some one says, "this would pre-

* From "The Principles of Design," by E. A. Batchelder. Published and for sale by The Inland Printer Company.

vent the use of anything but the block letter on business stationery where the smallest sizes of type are necessary." If printing were entirely an "art-for-art's-sake" proposition, this would be true, but in this connection utility is the chief factor. Take, for instance, a business card for a bank, as shown in Fig. 3. It is not desirable to set a large number of names of officers or directors in the text type on account of its lack of

FIG. 3.— The lack of shape harmony between text and gothic is not so noticeable when the smaller sizes of gothics are used.

legibility in the smaller sizes. Neither is it always desirable to use the angular gothic in the larger sizes for the feature line. In this case we use a roman or text letter for the feature line, eliminating the crudity of the gothic and substituting grace and beauty to the design, and set the names of the officers in a small size of the gothic, thus preserving the legibility. The fact that the angular solidity of the gothic is less noticeable in the smaller sizes helps to reconcile the differences in shape and produce a satisfactory result.

But in Fig. 4 is shown a different proposition. Here we have the close association of the larger sizes

of the text and gothic, and the effect is not what we would desire. The angular stiff lines of the gothic, which, in the smaller sizes and to the casual glance blend into a line that is rather pleasing, are in the larger size shown in all their crudity, and we are unable to find wherein the two type-faces have that "something in common" which is necessary to shape harmony.

The block letter, which includes many variations

FIG. 4.— The association of the larger sizes of text and gothic does not result in a pleasing effect.

from the gothic, such as Blair, etc., is distinctively a modern letter, while the texts and the old-style romans and italics are of ancient design. This suggests that, apart from their lack of susceptibility of pleasing association from the standpoint of shape harmony, they have nothing in common in point of historical relations toward each other. While, of course, the lack of historical precedent for the use together of certain letters is a small matter compared to their relation from the standpoint of the matter of harmony of design, still it must be considered. Ecclesiastical printing, for

instance, is closely associated historically with the text letter, and while on commercial stationery we may reconcile the use of the text with the modern gothic, we would hardly feel that under any circumstances could we use the modern gothic on the cover of a church program for a Christmas entertainment.

Too much stress can not be laid on the idea of confining the job in hand to a single series of type. This is becoming more and more a feature of all good printing, especially on cover-pages, title-pages and the general run of job composition. In work of this class whatever emphasis is necessary for certain lines can easily be supplied by the use of the larger sizes. In the composition of advertisements more variety in the type-faces is not only allowable, but in many cases is an improvement, the setting of one or more lines in a heavier type giving an attractive spot of color otherwise unattainable. However, this is not always necessary, as some of the largest advertisers, whose newspaper advertisements are models of attractive type-display, use one series exclusively. Where more than one series are used we must consider the suitability of the heavy type-face for association with the other series. As an example, a line of gothic, although heavy and adding emphasis to the advertisement, does not look well in connection with the Caslon Old Style. A heavy old-style face is much more to be desired. The " good old days " when we set the lines of a job in capitals and lower-case alternately and avoided the use of the same series of type in consecutive lines have passed away, and a consequent improvement is shown in the general run of printed matter.

While it would hardly seem necessary to make comment on the use of modern and old-style faces in

conjunction, still this combination is too often found. Old-style type is type made in imitation of the roman letters used before the beginning of the last century, while modern type is that kind of roman which has been cut since the beginning of the last century. The modern differs from the old style in that it is more regular and even and its serifs are less angular. The two faces differ both in their characteristics of design and their historical relations toward each other, and should not be used together.

After all is said and done, however, we must return to the fact that in nearly every case the best work is that in which but one series is used, and where there is any doubt as to the propriety of the association of two or more type-faces the better way is to stay on the safe side — and use but one. Even with the great decrease in the numbers of type-faces of to-day, as compared with a few years ago, the printer is really handicapped in many cases by too great a variety. We could still dispense with three-fourths of the type-faces now in use and do work fully as good — if not better — than we are at present turning out. However, business reasons and the great variety of tastes in type-designs make this reduction unlikely, and as long as the printer is not placed in a position where, through lack of an excess of type-faces, he is compelled to produce harmonious work, the only thing left for him to do is to make a study of the various letters and avoid bringing together those which, by reason of their characteristics of design or historical relations toward each other, are antagonistic.

Simplicity in Design

The simplest things are usually the best — and likewise the hardest to do.

A FEATURE too often overlooked or neglected in printing is simplicity of design. Keeping a job simple in design does not necessarily imply that it should be set in plain type, devoid of all ornamentation and embellishment, but it does mean an arrangement of the various groups of type and decorative material in such manner that the whole is easily comprehended.

When we start out to set a job — cover-page, title-page or any other piece of work — we must consider it as an arrangement of lines and masses, and must place these lines and masses in such positions that their relations toward each other shall be pleasing. Each one of the lines or masses is a force of attraction, and it readily follows that if we are to have a simple design we must have few of these forces of attraction. The copy must be carefully read and the various words and sentences grouped together closely, leaving but few spots to deal with.

In the specimen which has been selected to illustrate this point (Fig. 5), we note that there are no less than seven or eight separate groups, either of type or

FIG. 5.— An unpleasant effect, caused by the design being too complicated.

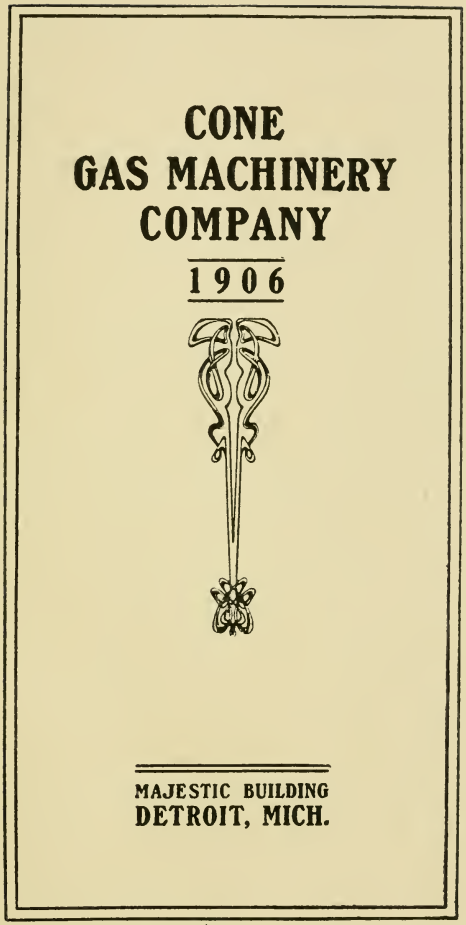

Fig. 6.— A more simple treatment of the page shown in Fig. 5.

decoration, each exerting a distinct force of attraction to the eye. The consequence is that in attempting to grasp the page the eye keeps jumping from one spot to the other, and in the end the effect is confusing and far from pleasant. In Fig. 6 we have a more simple arrangement of this page. The reading matter has been grouped into two masses and is readily grasped at a glance. The rule so extravagantly used in Fig. 5 has been utilized in placing a parallel rule border around the page, thereby giving a more finished effect but in no way complicating the design. The long ornament has been added as a concession to the length of the page, but it is placed in such manner that it becomes a part of the upper group, leading the eye down to the balance of the reading matter and still leaving but two forces of attraction.

In determining the number and arrangement of these groups on the page the preliminary sketch will be of the greatest value. This sketch need not in any way approach a drawing, nor need it contain any lettering. It is only necessary to indicate in a simple manner the outlines of the various groups. Fig. 7 shows a few suggestions as to the style of these preliminary sketches. They are the work of but a few moments, but they give a good idea of what will be the appearance of the finished design, and we start the work with a clear conception of what the result will be, instead of going at it in a haphazard manner. An analysis of Figs. 5 and 6 on this basis will illustrate this point. Imagine preliminary sketches made for these specimens after the manner indicated in Fig. 7. An adequate idea of what would be the finished appearance of Fig. 6 could be gained in this way, and the sketch in itself would show a pleasing arrangement.

But with Fig. 5 it is entirely different. An indication of the separate groups in this page would produce a complex mass of lines which would be far from satis-

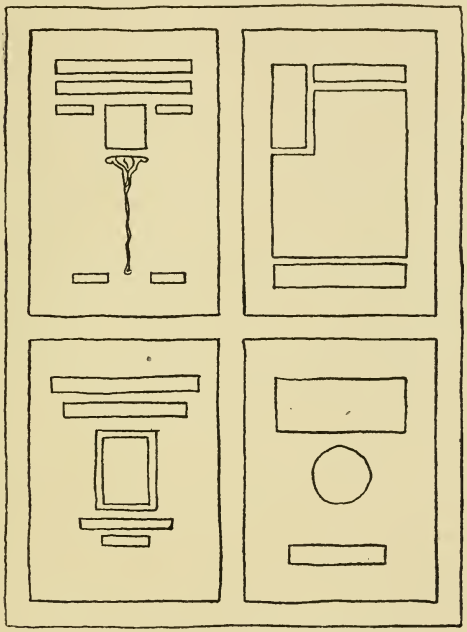

Fig. 7.— A few suggestions regarding preliminary sketches.

factory. If the sketch or plan from which we are to build up our design is not pleasing, it is entirely improbable that the finished work will be anything but the same. If a sketch of this kind had been made

for Fig. 5 prior to its being put into type it is hardly probable that it would have been set as it was.

Another important point is to consider a design in its most comprehensive form. The page as a whole must be always in mind. Just as the artist in drawing from the model keeps the whole figure in mind and considers what he calls the "big" lines — not losing sight of the drawing as a whole in the working out of unimportant details — so must the printer lose sight of the little things in contemplation of the greater feeling of proportion. The upper right-hand sketch in Fig. 7 is an apt illustration of this point. If we were to center our attention — as is so commonly done — on the fact that the space between the upper line and the top of the page is much greater than the space at the ends of the line, we would in all probability forget the relation of the lines to the page as a whole. The question is not the relation of the lines toward the upper rule or the side rule, or both, but is a consideration of their relation to the page in its entirety.

Proportion

By good proportions, whether in a house, on the page of a book, or in the formation of a single letter, we mean measure harmony, the means by which varying quantities may be so related as to be agreeable to the eye.—*E. A. Batchelder.*

AFTER having gained simplicity in our type-design by the condensing of the reading matter into a small number of groups or forces of attraction, the question of where to place these groups in order to achieve the most pleasing results presents itself, and the successful solution of this question calls for a consideration of proportion. In order to clearly discuss proportion we must have a concise definition of what proportion really is. To say that "Proportion is the pleasing inequality in the parts of an object" is perhaps putting it as simply and yet comprehensively as any of the definitions that can be found. A pleasing equality in the parts of an object constitutes symmetry, but in order to have proportion we must have a pleasing *inequality*. In other words, the divisions must not be equal lest they produce monotony, but must be unequal and in such relation one to the other that the effect is satisfactory to the eye. If we divide a rectangle exactly in the center, as shown in A — Fig. 8, the effect would not be pleasing; neither would it be effective for a type page, as both panels would be of equal importance. If we divided it as shown in B —

Fig 8, the effect would be that of the large panel crowding the smaller one off the page. Where, then,

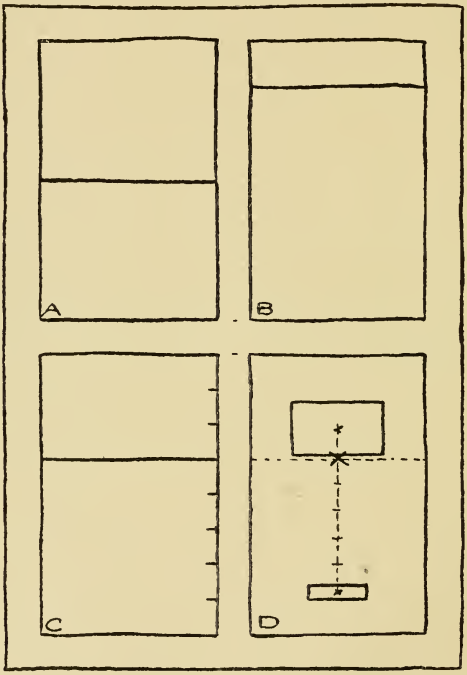

Fig. 8.— The division of the rectangle shown in A is not pleasing, owing to the equality of the two parts. In B the effect is also unpleasant, the two parts having no relation toward each other in size. In C we have a satisfactory division, caused by giving three parts of the rectangle to one panel and five parts to the other. D shows method of centering two spots of unequal size on this proportion.

are we to secure a pleasing division? Experiments have proven that a division which gives three parts of the rectangle to one panel and five parts to the other is the most satisfactory to the great majority of people. This division is shown in C — Fig. 8. Authorities differ slightly in their statements of these proportions, some giving it as three to five while others claim that the proportions of two to three are more correct. While it can hardly be said that art can be brought down to mathematical calculations, still some of the best designers of to-day follow these proportions throughout their designs with excellent results.

"But," some one may say, "what connection has all this discussion of the proportions of three to five with setting up a cover or title page?" Let us consider an extremely simple page on which is to be but one line of type. The most important question in connection with printing the page would be just where to place the one line. As the line has the effect of dividing the rectangular page into two parts we must place it in such position that the two parts will sustain the proper relations toward each other — not in the center, dividing the page into equal parts, nor yet so close to the top of the page that the inequality in the sizes of the two parts will not be pleasing. This is our opportunity to make use of the principle of the proportion of three to five and place the line in the position shown by the dividing line in C — Fig. 8. Although this is applying a mathematical calculation to the ascertaining of the proper position for the line, and while of course an unvarying adherence to this principle would in time be tiresome, still as a basis from which to work it is most excellent.

If, instead of a single line on a page, we have

several lines, but grouped in one mass, the placing is the same as for a single line — in such position that the center of the mass will be on the dividing line shown in C — Fig. 8. But with two or more groups or masses the problem becomes a trifle more complicated. Where in the former instance we placed the center of the one mass on the line, we must now place the *center of balance* between the two masses on that line. The upper group must be moved up enough to counteract the attraction exercised by the lower group. In D — Fig. 8, is shown an example of the manner in which to ascertain the center of balance between the two masses. If they were of equal size the center of balance would naturally be in the middle of a line drawn from the center of one group to the center of the other. But the inequality in size necessitates a different placing. Mr. E. A. Batchelder, in "The Principles of Design," * treats of the balancing of masses of unequal sizes in the following entertaining manner:

"Supposing our measures are unequal; what then? They may be likened to a man and a boy on a 'see-saw,' the man weighing twice as much as the boy. Note carefully the steps taken to find the point of balance in this instance. We will draw a line connecting the centers of the spots, as before; but it is plain that the balance point can not be in the middle of that line. If the man weighs twice as much as the boy, it would be necessary to give the boy two parts of the board and the man one. Just so with spots of print. As these spots have a ratio of two to one, the smaller spot must be given two parts of the line, the larger spot one part." In D — Fig. 8, the same principle is

* "The Principles of Design," by E. A. Batchelder, published and for sale by The Inland Printer Company.

applied, except that the larger spot is given one part of the line and the smaller spot five parts, as the larger spot is approximately five times as great as the smaller one.

The title-page shown in Fig. 9, with its resetting, Fig. 10, illustrates this question of proportion. In Fig. 9 the pleasing inequality necessary to proportion is missing, both in the manner of placing the feature line and in the manner of the "whiting out." Note that the amounts of white space are almost equal throughout the page — above and below single lines, groups or dashes — producing a monotonous and unsatisfactory appearance. Then, too, the center of attraction of the page — the feature line — is placed in such proportion that it divides the page close to the center. In the resetting — which is the same except for the changes in "whiting out" or the placing of the spots — the reading matter has been condensed into fewer groups and those groups placed in such position that the center of balance between them comes on a line placed in the proportion of three to five, above referred to. This also gives us the pleasing inequality desired in the spaces between the various groups and lines.

The printer is peculiarly fortunate in his work as far as proportion is concerned. The customs of centuries have resulted in his being compelled to deal with rectangles of fairly good proportion. He finds, for instance, that he must set a page 6 by 9 inches in size, to be cut from a sheet of paper 25 by 38 inches. The proportions are already decided, and decided on the basis of two to three, the width of the page representing two and the height three. The margins around the type page are decided in the same manner. Authorities on bookmaking tell us that the front margin of a

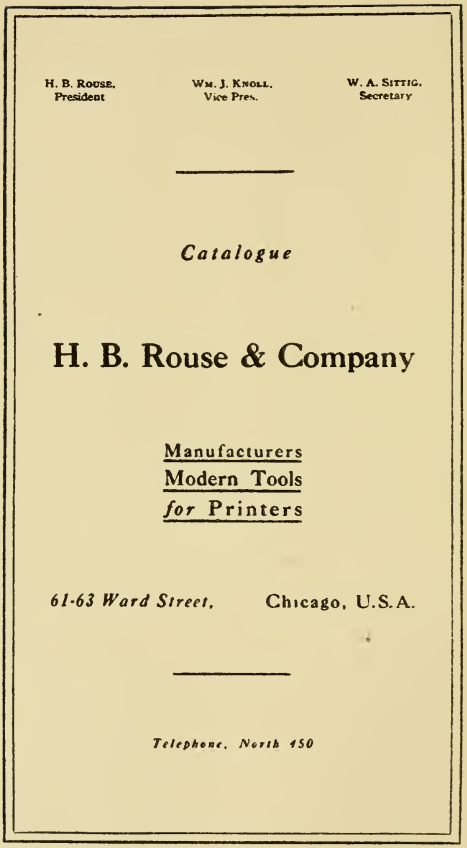

Fig. 9.— An unsatisfactory effect, caused by a lack of inequality in the distribution of white space. The feature line is also too close to center of page.

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Modern Tools
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61-63 Ward Street, Chicago, U. S. A.

Telephone, North 450

FIG. 10.— A resetting of the page shown in Fig. 9, showing a variation in the "whiting out" and with the feature line dividing the page into pleasing spaces.

page should be one and one-half times the back margin, and that the foot margin should be one and one-half times the head margin— in other words, the space for margin should be divided into five parts, two of which should be allowed to the back or head margin and the other three to the front or foot margin.

Tone Harmony

Tone harmony occurs when tones sharing some common quality are used; or lacking this, the differences may be reconciled by varying the quantities of the tones used.— *Batchelder.*

FEATURE most frequently overlooked — yet one that is all-important in the production of good printing — is tone harmony, the absence of which is noticeable in such a great proportion of our work. We note its absence chiefly in the relation of initial letters to text, in the relation of ornament to type and in the relation of type and rules. The first mentioned, the lack of tone harmony between initial letter and text, is probably the most frequently found.

It would be well, perhaps, before taking up the question of the harmony of two or more objects, to briefly consider the securing of a pleasing tone in the type page which has no rules, ornaments or initial letters — the page of plain body-type. In the first place, ordinary body-type set solid and printed on white paper will produce a page of about the proper color value. But the moment we begin putting leads between the lines we weaken the tone, and in addition to this the leads tend to separate the matter into bands of color across the page instead of a solid, even tone. Especially do the more modern type-faces with the high ascenders give unpleasant effects when leaded.

RECITAL

by pupils *of* Miss Patton *and* Mr. Tucker *of* Ohio College of Music *at the* Y. M. C. A. Auditorium, June 29, 8 p. m.

FIG. 11.—A lack of tone harmony between ornament and type, the decoration being too prominent while the reading matter is subordinated.

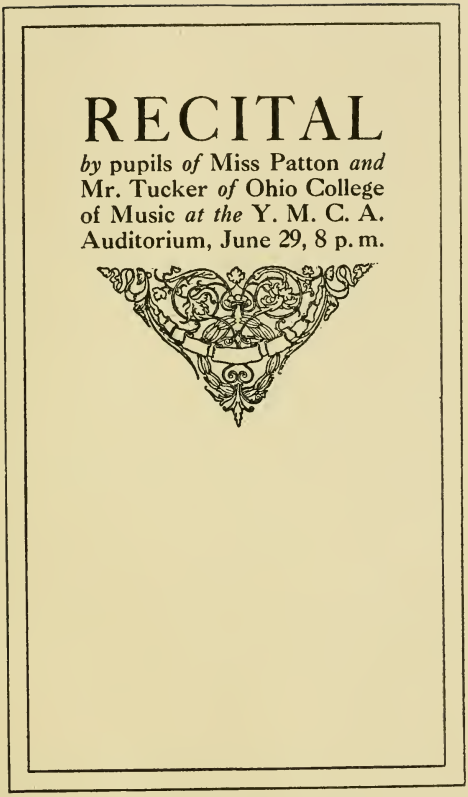

Fig. 12.— A resetting of the page shown in Fig. 11, but with an ornament which harmonizes in tone.

The richness of tone so much admired in the books of the early printers was due in a great measure to the fact that they had no leads. Another thing which will aid greatly in insuring an even tone on the printed page is the omission of wider spacing after periods. Where the period is followed by the same spacing that is used in the balance of the line there is an absence of the spots of white so noticeable when em quads are used.

As stated above, the lack of tone harmony is most frequently noticed in the use of initial letters with text, and in fact it would seem from the numerous instances in which this is apparent that many printers do not give the subject any thought at all, but put in whatever initial happens to be handy. Of course many are handicapped through not having a variety of initials of varying tones, but where such is the case a letter of a larger size of the series used for the body-type will answer all purposes — and a plain initial of this sort is greatly to be preferred to a decorative letter which is either too light or too dark for the balance of the page.

Then comes the question of the relations of the type and decoration. How often we see a job on which an ornament stands out so prominently as to almost obscure the reading matter, which should properly be the first thing to attract the eye. As in the case of the initial letter, it is far better to have no decoration at all than to have it so prominent that all else is subordinate.

In Fig. 11 is shown an instance of lack of harmony of tone between type and ornament. Here the ornament is so heavy that it actually seems to stand out in front of the reading matter. The eye is

attracted by it and irresistibly drawn toward it even when trying to read the matter above. This is not an

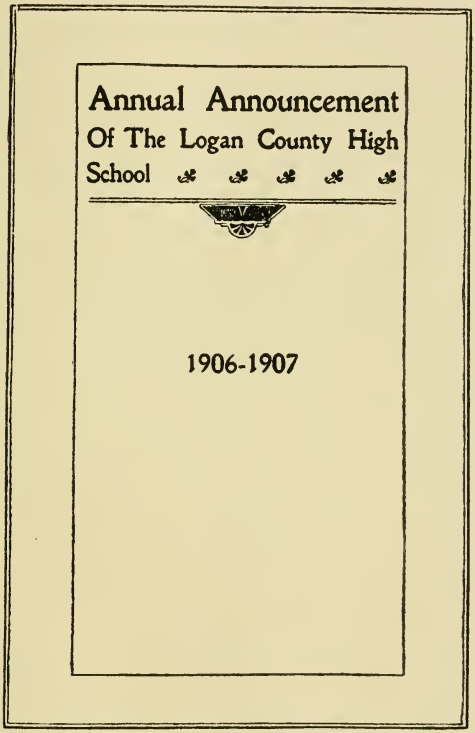

Fig. 13.— In this case the inner rules should have been a trifle heavier in order to secure a harmony of tone.

exaggerated case. Instances of lack of tone harmony as striking as this are found every day.

Fig. 12 shows the same job with an ornament which more closely harmonizes with the text. In this case the decorative feature is but supplementary to the utility feature, completing the design and adding

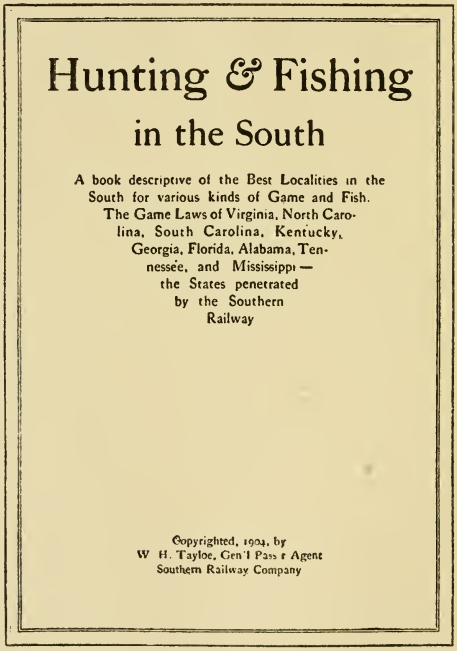
Hunting & Fishing
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Fig. 14.— A simple title-page, yet the relation of the type and rules makes it very effective and pleasing.

a pleasing touch, but not forcing itself on the attention as the all-important thing.

The same is also true concerning the use of type and rules, and is especially noticeable in many instances where rules are used for underscoring lines. Light-faced type is underscored with three and six point rules, while under heavy lining gothic lines we find the hair-line rules. Surely a little care and attention would prevent many of these seemingly unimportant errors which mar the appearance of so many printed specimens. Take Fig. 13, for instance. How much more attractive this design would be if the inner rules were a trifle heavier, to correspond to the weight of the type-face. As it is now, they are so weak as to be about useless. In direct contrast to this is Fig. 14. Here we have an almost severely simple title-page, yet harmonizing so thoroughly in color as to give a most pleasing result.

Shape Harmony

Shape harmony would imply that all the shapes in a piece of work must share some common property. For example, curves and curvilinear figures would go well together; straight lines and rectangular figures would be classified in the same way. Thus if we would have complete shape harmony we would see that all the figures in a design were similar, or at least governed by the same law.— *Batchelder.*

THE question of shape harmony as applied to type-faces was discussed briefly in a previous installment under the head of "Association of Type Faces." But when we have considered the harmonious relations of one type with another we have merely begun a study of shape harmony as applied to the printed page. For instance, the shape of the type-page should harmonize with that of the paper, the shapes of the various masses of which the type-page is composed should harmonize one with the other, and if decorative material is used it should not only harmonize with the shape of the letter but should also harmonize with the shape of the masses formed by the letters.

In Fig. 15 is shown a lack of consideration of the last-named requirement. While the ornament here used is Gothic in design and in that respect proves pleasing when used in connection with the type in which the page is composed, its enclosure in a border of rules gives it a square shape that is not at all in keeping with the shape of the mass formed by the

group of lines above. Fig. 16 shows the use of an ornament, also Gothic in design, the shape of which is much more in accordance with that of the mass of

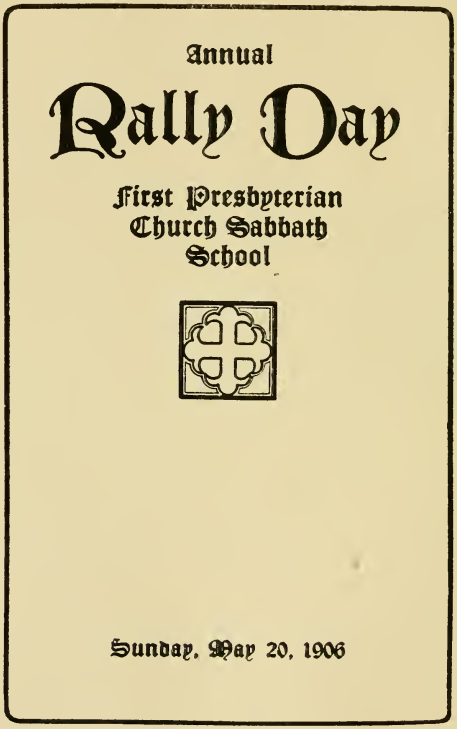


Fig. 15.— Although the ornament harmonizes with the type in that both are Gothic in design, its square shape is not in keeping with the shape of the mass of type.

type above. The square ornament, the use of which in Fig. 15 was not at all pleasing, is shown to much better advantage in Fig. 17, harmonizing most satis-

Fig. 16.— A more pleasing effect, gained by using an ornament which harmonizes in shape with the group of type.

factorily with the rectangles formed by the rules. The originals of these jobs were both in black and red and were in consequence much more pleasing than are the reproductions.

While the compositor is giving consideration to the question of shape harmony between text and decoration, he should not forget that the ornamentation should be appropriate to the subject in hand. Many amusing instances of lack of thought in this direction are continually coming to notice. A title-page of a recent program for an entertainment to be given by the choir of a Methodist church furnishes a striking illustration. The compositor, intent on finding a bit of decoration of the proper shape and tone, and without a thought as to the relation of the character of the decoration toward the purpose of the program, placed a cut of a dancing girl in a prominent position on the page. This got no farther than the first proof, but one can well imagine what would have been the results had the others with whom the proof came into contact done as little thinking as did the compositor. This is much the same as the old story of the printer who set up an obituary notice for a newspaper, and, thinking to make it rather out of the ordinary, enclosed it in a border. His selection of the border was rather unfortunate, however, for he chose what the typefounder called a "flame" border, the design of which showed very plainly how it came to be so named.

Lack of shape harmony between ornament and type is too frequently noticeable in commercial work. Letter-heads or bill-heads set up in lining gothic and embellished with scroll decorations or ribbon-like borders are common, while the three-cornered birds and

other angular effects of the modern revival of chap-book typography are used in attempts to add attract-

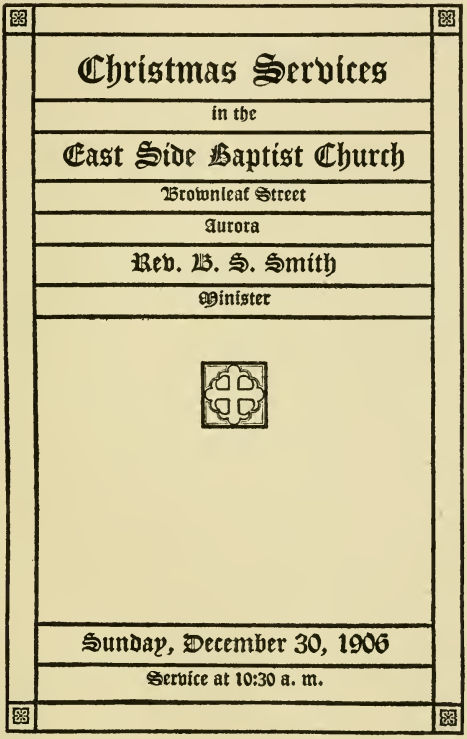


FIG. 17.— The square ornament, which was not satisfactory in the page shown in Fig. 15, appears to much better advantage in this design.

iveness and beauty to pages set in the graceful and flowing italic.

Fig. 18 shows a striking illustration of absence of shape harmony between text and ornament. This may seem to some to be overdrawn, but instances paralleling this in their utter disregard for all consideration of the fundamental principles of design are continually

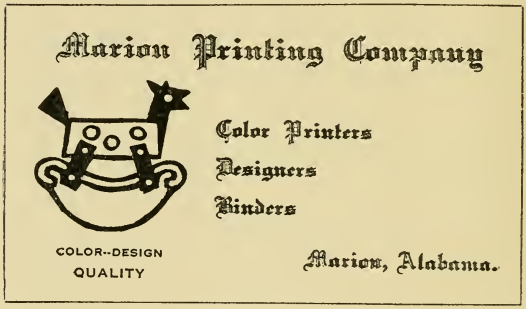


Fig. 18.— An utter disregard for the consideration of shape harmony characterizes this card.

being found. The bringing together of the text-letter, with its character and beauty of Gothic design, and the crude, meaningless decoration, with its total lack of beauty, is inexcusable.

Far better the white space than decorative effects which do not harmonize with the type-face and the subject. Delicate hair-line ornaments are out of place on a letter-head for a blacksmith, as are also the crude chap-book ornaments on a letter-head for a professional man.

Typographical Designing

Good designs are invariably sane, regular, orderly, consistent throughout. A piece of work well done brings to the beholder a sense of satisfaction, completeness; there is no desire to change a line or an area, or to vary any of the tone relations.— *Batchelder.*

TO sum it all up, the printer must, in order to produce satisfactory and pleasing work, base it on the fundamental principles that underly all design, whether it be the designing of a building or the designing of a cover-page. And in this connection it would be well for the printer to note carefully the proportions and shapes found in architectural design, for he will soon discover beautiful proportions applicable to the printed page.

Let us briefly consider the designing of a piece of typography in accordance with these underlying principles, considering their relations with each other during each step toward the completion of the work.

In the first place, we should roughly block out our idea in the shape of a sketch. It is impossible to say too much in favor of the preliminary sketch as an aid to good typography. It would be just as absurd to commence building a house without a plan as to commence a piece of typography without a clearly defined idea of what the result is to be. Of course, long experience enables one to plan much of the work without

this sketch, but until one can mentally " see " the completed work and know positively what will be its appearance, he should resort to the plan of sketching the design. This is the only manner in which we can assure ourselves of that " sense of satisfaction, completeness, with no desire to change a line or area," mentioned in the quotation above. When we start a piece of composition in the haphazard manner of so many printers, without this clearly defined idea of the result, we are almost certain, after the job is finished and the proof taken, to have a desire to change not only one but several of the lines or areas. But the preliminary sketch does away with this uncertainty. The printer who bases his work on this method does not need to wait until the proof is taken to find out whether or not the job will " look good." He knows that if he has a pleasing arrangement of lines and masses in his sketch that his finished product will be pleasing; and, furthermore, he knows *why*. It is not a question of chance.

In making this preliminary sketch the consideration of simplicity must come first, because in dividing our reading matter into groups we determine by the number of these groups whether the design shall be simple or complicated. " Keep it simple " should be continually in the mind of the printer. While it is possible in some classes of work to err on the side of too much simplicity, this is by no means a common thing. In fact, it is quite the reverse. Overornamentation and complicated designs are the most noticeable features of the printing of the present day. The compositor seems to be either afraid or unwilling to give the stock and the ink and the presswork an opportunity to assist in the making of a good job, but seems

to think that he must do it all with rules and ornaments. The following quotation aptly covers this point: "It is a hard matter for the printer who is given copy for a *fine* job to do a five-minute piece of practical composition and then let good presswork, good ink and good stock combine to make a good job. The man who learns to hold himself to the simple things can be relied upon to do the elaborate kind when the occasion will permit." Simplicity in design does not necessarily mean plain type, it does not mean lack of rules or ornaments; but it does mean that these things shall be combined into few groups so that the whole may be easily comprehended. We all know that if we attempt to display each line or sentence in an advertisement the result is usually a confusing mass with nothing displayed. The same thing is true of any typographical design. Each spot on the page attracts the eye to a greater or less extent, and the more spots we have on the page the greater is the liability of the attention being diverted from the main issue.

Then when we have, by the division of our matter into few groups, made certain that the design will be simple, we must next devote our attention to proportion, that "pleasing inequality in the parts of an object" so necessary to a satisfactory result. We must see to it that the page is neither divided into panels or groups or spaces of equal size, thus giving a monotonous appearance, nor divided so that the panels or groups or spaces are so far different in size as to have no relation toward each other.

Then we must consider the shapes of the groups or panels, both in their relation toward each other and in their relation toward the shape of the page as a

whole. How often we see a page of, say, 6 by 9 inches in size, across the center of which, dividing it into two equal parts, is run a panel or a group of two or three lines set in a measure that allows but four or five picas' margin at each end — a long narrow shape cutting directly through the center of a page that is more nearly square. And how frequently we see a printed page which, if sketched in masses, would be but a mixture of shapes of almost every conceivable kind. The preliminary sketch prevents this kind of typography. When we make the sketch we will hardly fill a rectangular shape with triangles, circles, squares and oblongs and expect to secure a pleasing appearance, but when we set a job without a sketch or at least a definite idea of what we expect to accomplish the result is often just such a mixture of ill-assorted shapes.

Then, having secured harmony in the shape of the groups and masses comprising the design, we have completed the sketch. We have a clear idea on paper of what will be the appearance of the finished job — a sketch in lines and masses. This sketch is simple, its different masses or divisions are proportionate, one to the other, and they harmonize in shape. We know that as far as the design is concerned we will have a pleasing job. The next question, then, is the choice of type. Here we must again consider shape harmony. If the page is long and narrow the most pleasing results will be found in the use of a rather condensed type-face with high ascenders, while if the page is broad a more extended letter will prove more satisfactory. If an initial letter is used it should, if possible, be of approximately the same shape as the type page. Usually but one series should be used and,

where the copy will permit, the ideal page is the one on which either all capitals or all lower-case are used. Where more than one series of type is introduced — and this need be seldom, as the necessary emphasis can usually be given certain lines by the variety in the sizes of one series — the type-faces should have common shape characteristics. An indiscriminate mixing of condensed and extended letters, plain and decorative letters, etc., should be avoided. Everything considered, as stated above, the most pleasing and artistic printing is that which is not only confined to one series but which is set in either all capitals or all lower-case of that series.

And while we are careful to secure harmony of shapes in our design and in our selection of type-faces, we must not, as is so frequently done, overlook all consideration of tone harmony. The lack of tone harmony is most commonly exemplified in the use of initial letters, ornaments and rules, and a little thought along this line would secure much better results. We should see that the different masses which constitute the page are of approximately the same tone. When we consider tone harmony in connection with the printed page we will hardly set a job in heavy type, such as Blanchard or Hearst, and put around it a border of hair-line rules, nor will we use a heavy black initial in a page of Caslon old-style. Yet these things are found in the majority of the printing of to-day. Then, too, when rules are used for underscoring — a thing, by the way, which could be dispensed with in a great many cases with benefit to the job in hand — the rules are frequently either too light or too dark to look well with the type. A line of 24-point lining gothic underscored by a couple of hair-line rules is

not a pleasing sight, and yet this and similar instances are found daily.

The printer who will keep these fundamental principles — simplicity, proportion, shape harmony and tone harmony — constantly in his mind when designing and setting a piece of typography will hardly fail to secure satisfactory results. His work will be built upon a solid foundation and the element of chance as to the outcome will be no greater than that of the man who builds a house by carefully following a plan. Then, too, his ability to design meritorious original work is greatly enhanced by his knowledge of and adherence to these principles. Originality in printed things is very common, but much of it falls far short of possessing merit. We may occasionally originate something really good by the hit-or-miss method of typographical arrangement, but in order to assure ourselves of satisfactory results we must build up our work, understandingly, on the foundations of the principles of design. This eliminates the doubtful question of personal likes and dislikes and gives us a solid basis on which to judge our own work and that of others.

The Science of Color

The printer in handling color is making an appeal of the most subtle and delicate nature, vastly more so than is made by the type-matter that may form the body of the piece of printing he is embellishing with color. — *George French.*

HAT might be termed a working knowledge of color is as essential to the printer as is a knowledge of the principles of design, especially such knowledge of color as is applicable to printing in two colors. An absence of an understanding use of color is probably more frequently noticeable in two-color work from the fact that this class of printing is done in every office, large and small, while the more pretentious colorwork is largely in the hands of artists and designers. Although the use of two colors of ink in the production of printed matter is a problem which confronts every printing-office, the study of the use of colors in a manner productive of the most pleasing results is one to which more attention could well be given. Much of the attractive printing in colors is the result of accident rather than the result of a knowledge of color, as is evidenced by the fact that beautiful examples of printing are found in the same package with specimens on which are used the worst possible color combinations.

Some printers know instinctively which colors may

be used together with satisfactory results. These men, we say, are endowed with "good taste" — which "good taste," however, does not prevent them from occasionally producing an atrocious color combination. But what of the printer who is not possessed of this good taste; how shall he successfully print in colors? The only method by which he can secure good results is that by which the printer with an instinctive knowledge of what is good in color may avoid his occasional lapses or blunders — by an understanding of the theory of color and its application to the printed page. He should know that certain colors produce certain sensations on the optic nerve and that certain combinations of colors produce pleasing sensations, while other combinations produce the reverse; he should know that the question of color is not a question of personal likes and dislikes, but a question of scientific facts; and, furthermore, he should know *why* these things are so. The knowledge that red and green harmonize is well enough as far as it goes, but unless one knows the reasons for this harmony his printing in colors will not be on a basis calculated to secure uniformly good results.

In the first place, the printer should understand what constitutes color, and in order to understand what color really is we must take up a consideration of light. Light is the form of radiant energy that acts on the retina of the eye and renders visible the objects from which it comes; the illumination or radiance that is apprehended by the sense of vision. Without going too deeply into the science of light and color it may be stated that light is a combination of all colors and rays, some of which are visible while others are invisible — in fact it is estimated that the human

eye is able to see but about twenty per cent of these rays. That light is a combination of all colors and rays we may readily prove to our satisfaction by letting a ray of sunlight pass through a prism, or three-sided piece of glass, on white paper — preferably in a darkened room. The result will be the dividing of

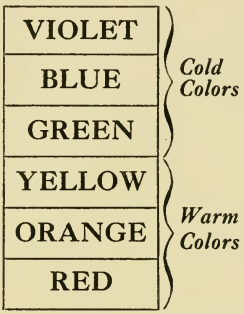


Fig. 19.— Diagram of the spectrum, a rainbow-like band of color formed by passing a ray of sunlight through a prism, or three-sided piece of glass.

the ray of light into its component colors, and we will have a rainbow or spectrum — a beautiful band of six colors ranging from red at one end to violet at the other, the colors gradually blending into each other. The rainbow is formed in the same manner, the rain drops acting as the prism. These spectrum colors being, like the rainbow, always the same, they form an unvarying standard of color. Fig. 19 shows a diagram of the spectrum thus formed, and gives the six colors — red, orange, yellow, green, blue and violet — in their proper order. If we carry this experi-

ment still farther, and pass this band of colors through a second prism, they will again unite and form a ray of white light, but if instead of passing the whole band of color through the second prisms we pass but one color — for instance, red — through, we will still have red. These colors also produce varying sensations of heat and cold, red producing the greatest sensation of heat, orange next and so on, until, at the other end of the spectrum, in violet we realize the greatest sensation of cold. As shown in the diagram, red, orange and yellow are the warm colors, while green, blue and violet are cold colors. In the case of green, however, there are sometimes exceptions. The green of the spectrum is a cold color, but the addition of yellow, making a yellow-green, will give the feeling of warmth. This fact that green, unlike the other colors, may be either warm or cold, gives it a wide range of usefulness. The extremes of green harmonize with each other, while those of other colors do not. Therefore, because of the fact that green in itself contains both the warm and cool tones, we can get more variety by its use than we can through the use of any other single color.

Just as different kinds of music affect us in different ways, so it is with color. Violet, blue and blue-green, or cool green, have a restful action on the brain, while red, orange and yellow irritate it. Recent experiments have shown that blue and violet quiet the nerves and are successfully used in the treatment of nervous disorders, while red is employed with excellent results in the treatment of melancholia. Red is universally recognized as the color of danger, violence and passion.

"But," says the printer, "what has this discus-

sion of hot and cold colors, etc., to do with job printing?" Simply this: that if color, as stated above, is a matter of scientific facts and not a question of personal tastes, and that if by the use of certain colors or combinations of colors certain sensations are produced on the nerves, then the printer who would successfully print in colors must have an understanding of this action of color and the reasons therefor. He must know when to use colors that are restful and soothing to the eye and when to use colors that will tend to excite or irritate the nerves.

A brief summing up of the foregoing gives us the following points:

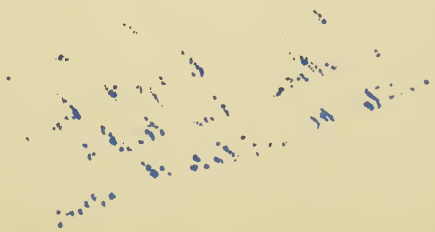
That white light is a combination of all colors.

That color is a sensation produced on the retina of the eye by the action of one or more of the elements of light.

That the prismatic spectrum is the rainbow-like band of colors formed by passing a ray of light through a prism — a band of colors in the following order: red, orange, yellow, green, blue, violet.

That these colors may be reunited into a ray of white light by being passed through a second prism.

That some of these colors are called warm colors and others cold colors, according to whether they produce sensations of heat or cold. Red, orange and yellow are warm colors, while green, blue and violet are classed as cold colors. Green, however, being a mixture of yellow and blue, may be warm or cool in tone. If a preponderance of yellow is used in its make-up it is warm in tone; if a preponderance of blue is used, it is cool in tone. The green of the spectrum is cool in tone.



That the spectrum colors, being always the same, form an accurate standard of color.

That the cool colors — green, blue and violet — have a restful, soothing action on the brain, while the warm colors — red, orange and yellow — tend to irritate it. That this psychological effect of color is recognized in its use in the treatment of nervous disorders.

Primary, Secondary and Tertiary Colors

Mere sound gives us but little pleasure; when developed, however, into its highest form, music, we are thrilled, as by the song of a bird, a favorite ballad, or a Beethoven symphony. So in light, our enjoyment culminates at the glories of color in a flower or a sunset, at the shadows that play over the hills, or at the varied hues of a salt marsh. Hence we may aptly term color the music of light.— *Vanderpoel.*

IT follows, then, that without light there is no color. When light, which contains all of the colors in their proper proportions, falls upon an object, that object reflects some of the rays and absorbs others. If it reflects only the blue rays we say that it is blue, while if it reflects the red rays we say that it is red, etc. Any substance that reflects all of the rays we call white, while a substance which absorbs all of the rays, and reflects none, we call black.

The uneducated eye sees only the stronger contrasts of colors; the more educated the eye becomes the greater is the number of the tones perceived. The Indian, for instance, employs in his decoration the crude yellow, red and blue, and leaves the more subtle harmonies of the shades and tints and broken colors to those further advanced in the study of color.

Three of the colors of the spectrum — red, green and violet — will, by mixture, produce all of the other colors, and for this reason these three colors are called the fundamental colors. While this is of the utmost

importance to photoengravers and process-printers, it does not apply to ordinary printing in colors, and the fundamental colors must not be confused with the primary colors. Fundamental colors are spoken of and used in relation to transparent light, but when we

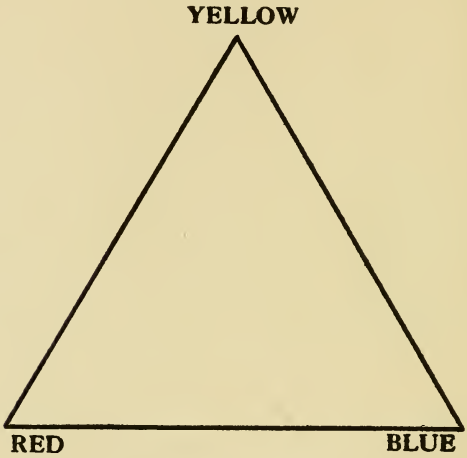


Fig. 20.— Diagram showing the primary colors — none of which can be produced by mixture, but from which, by mixing, all the other colors may be made.

come to use printing-inks or other pigments we are dealing with an opaque substance and reflected light. Sir Isaac Newton, after much experimenting, discovered that in pigments there were three colors which could not be produced by mixing, but from which, by mixture, all other colors could be made. These three colors are red, yellow and blue, and are known as the

primary colors. In order to fix this more clearly on the mind, Fig. 20 shows a triangle, each corner of which represents one of the primary colors.

In Fig. 21 we have added another triangle, inside of the first, at the corners of which are the colors

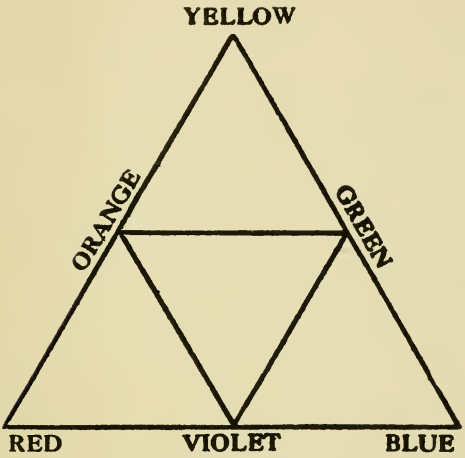


FIG. 21.— Primary and secondary colors. Each secondary color is a combination of the two primary colors between which it appears.

known as secondary colors — so called because they are produced by combinations of the primary colors, two of the primary colors entering into the make-up of each secondary color. These secondary colors, as will be noticed, are the remaining colors of the spectrum — green, orange and violet. Each secondary color is shown between the two primary colors of

which it is formed — yellow and blue forming green, blue and red forming violet, and red and yellow forming orange.

What are known as the tertiary colors — each of which is formed by a combination of two secondary

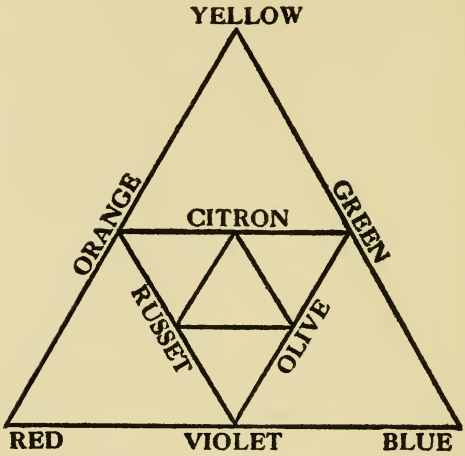


Fig. 22.— Primary, secondary and tertiary colors. Each tertiary color is shown between the secondary colors of which it is composed.

colors — are shown in Fig. 22. Thus we see that orange and green form citron, green and violet form olive, and violet and orange form russet. All of the primary, secondary and tertiary colors are shown in this diagram, and its careful study will do much to assist the printer to an understanding of the theory of colors and consequently the mixing of colors.

In summing up the foregoing we get the following points:

That without light there is no color.

That white light contains all of the colors in their proper proportions.

That the color of an object is merely that part of the white light which the object reflects. If it reflects all of the light, it is white, if it reflects only the red rays, it is red, etc.

That red, green and violet are the fundamental colors — so called because in transparent light they will, by mixing, produce all of the other colors.

That red, yellow and blue are the primary colors — so called because in pigments they are the only colors that can not be produced by mixing, but from them all other colors can be mixed.

That orange, green and violet are the secondary colors — so called because they are produced by combinations of the primary colors, two of the primary colors entering into the make-up each secondary color.

That citron, olive and russet are the tertiary colors — so called because each is formed by a combination of two secondary colors.

The Color-wheel

In music it is an established fact that certain notes used in combination produce harmonious sounds. The moment that more than one note is struck, there is danger of discord, and when ten notes resound to the touch of the player, they must be the right notes, or the sounds jar upon the sensibilities. In the use of color the same law of exactness applies. — *The Philosophy of Color.*

HAVING fixed in our minds the primary, secondary and tertiary colors, together with a knowledge of how they are formed, we come to a consideration of their use one with the other. Which colors may be used together with pleasing results? Harmony of colors as applied to the printed page may usually be divided into three groups, as follows:

Complementary harmony, or harmony of contrast.

Harmony of a shade and a tint of a color.

Harmony of black with other colors.

Taking them up in the order above named, we will first consider complementary harmony. As before stated, white light is a combination of all the colors. In order to have a complementary harmony we must use two colors which, when mixed, will give the equivalent of white light. In other words, the complement of a color is that other color which when mixed with it will give the sensation of complete white light. We can not take this literally in connection with printing-ink, however, for, as before stated, we

are dealing with opaque substance and reflected light. Theoretically, complementary colors when mixed will produce white, but in printing-ink the mixture of complementary colors gives a neutral gray, possessing no trace of either of the colors used in the mixing. Now, if red, yellow and blue combined form white light it follows that if we wish to form white light with, for instance, blue and one other color, the other color must contain the red and the yellow. The mixing of the red and the yellow gives us orange — the complement of blue. Again, the complement of a secondary color is that primary color not included in its make-up. Thus red is the complement of green, blue is the complement of orange, and yellow is the complement of violet. That these colors, which are as far removed from each other as possible, will harmonize, seems strange at first, but a simple experiment will show the reason for this. Take a piece of white paper and place on it a spot of ink or paint or a piece of colored paper. Look steadily at it for thirty or forty seconds and then, keeping the eyes fixed on the same spot, suddenly cover it with a piece of plain white paper. In a few seconds the image will appear plainly on the white paper, but in the complement of the color which was used. For instance, if a spot of red ink is used, the white paper will appear to show the same spot, but in green instead of red. Look at the flame of a gas jet steadily for thirty or forty seconds, then turn out the light, keeping the eyes fixed on the same spot, and the flame will reappear, but in the complement of the yellow-orange of the original flame. The optic nerve, becoming satiated with the one color, reacts, when that color is removed, to the exact opposite of that color. It may be likened to a pendulum which,

drawn up on one side and released, does not return to a normal position at the bottom and remain there, but reacts to practically the same height on the reverse side. The nerves which are tired by the one color are

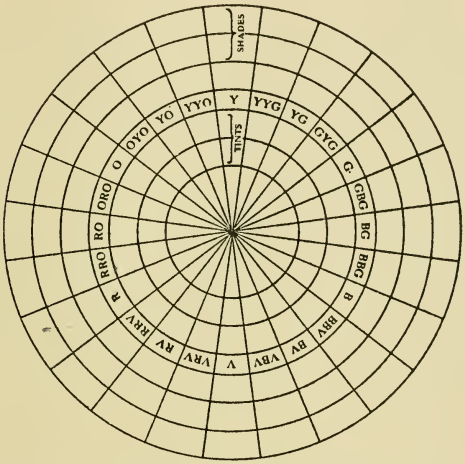


Fig. 23.— Diagram of color-wheel for determining complementary harmonies, harmonies of shades and tints, and harmonies of black with colors.

unaffected by its opposite, and vice versa, and thus a normal condition is preserved.

A simple and convenient aid to the study of color harmony will be found in the color-wheel reproduced in Fig. 23. This is nothing more nor less than the spectrum, shown in Fig. 19, arranged in the form of a circle instead of a straight line, with the addition of

extra hues caused by mixing the spectrum colors. At the expense of a few cents and a little time the printer can make one of these wheels and keep it as a reference. It readily shows the complementary harmonies, the harmonies of shades and tints and the harmonies of black with other colors, as will be later explained. By keeping in mind the simple instructions here given for the use of this wheel the printer need never be at a loss for harmonious color combinations. The original of the wheel here reproduced is fourteen inches in diameter, with the diagram drawn on white cardboard and the little spaces filled with colored papers. These colored papers may be procured from the Prang Educational Company, Chicago, New York and Boston, and are known as Prang's standard colored papers. A single pad, which will make several wheels, may be had for 10 cents. The papers are colored with approximately the true spectrum colors. The twenty-four colors necessary to complete the wheel are given, together with two shades and two tints of each color. They are pasted on the wheel as shown in the diagram — taking red for example — darker red in the outer circle, dark red in the next, red in the next, light red in the next, and lighter red in the circle nearest the center of the wheel. This gives a gradual gradation of each color from a deep shade to a light tint — five in all. The colors themselves are designated by letters, the explanation of which is as follows:

Y — Yellow.
YYG — Yellow-yellow-green.
YG — Yellow-green.
GYG — Green-yellow-green.
G — Green.
GBG — Green-blue-green.
BG — Blue-green.
BBG — Blue-blue-green.
B — Blue.
BBV — Blue-blue-violet.
BV — Blue-violet.
VBV — Violet-blue-violet.

V — Violet.
VRV — Violet-red-violet.
RV — Red-violet.
RRV — Red-red-violet.
R — Red.
RRO — Red-red-orange.
RO — Red-orange.
ORO — Orange-red-orange.
O — Orange.
OYO — Orange-yellow-orange.
YO — Yellow-orange.
YYO — Yellow-yellow-orange.

A glance at the diagram will show the simplicity of this arrangement. For example, B stands for blue and G for green. A mixture of blue and green gives blue-green (BG) — placed half way between blue and green. This blue-green mixed with green gives us still another step — green-blue-green (GBG) — a blue-green nearer the green than blue, while the blue-green mixed with blue gives us a blue-blue-green (BBG), a blue-green nearer the blue than the green. The same is true of the other colors. There may be still further subdivision, as far as the eye could distinguish, but for ordinary use the 120 colors, shades and tints will be found ample.

A summing up of the foregoing gives us the following points:

That complementary harmony is gained by the use of any two colors which, when combined, produce white light; that is, when the two sensations unite they affect the eye the same as white light.

That while theoretically all the colors combined will give white, in the use of printing-ink and other pigments we find that all colors mixed will give a neutral gray, varying in tone according to the strength and purity of the pigments used.

That each secondary color is complementary to the primary color not included in its make-up.

That if we look steadily for thirty or forty seconds at a spot of color on a piece of white paper and then

cover it with another piece of white paper, the spot will appear on the blank paper, but in the complement of the first color; that is, if a red spot is used, the same spot will appear on the blank paper, but it will be green instead of red.

Complementary Harmony

The reasons for desiring reliable knowledge of these qualities are clear. Brilliancy is obtained by using complementary colors side by side, because each gives to the other its favorable halo of color.— *George French.*

OMPLEMENTARY harmony, then, is the harmony of contrast. The colors which are the farthest apart may be combined with pleasing results. The color-wheel shown in the last installment being arranged in such manner that the colors which are the farthest apart are on opposite sides of the wheel, we can readily see that, having selected one color for our job and desiring another which will harmonize with it, we will find it directly across the wheel. We have already seen that violet and yellow form a complementary harmony — yellow being a primary color and violet being a secondary color composed of the other two primary colors — red and blue. If, however, instead of using the violet, we move two points to the right on the diagram and use the blue-violet, we must move a corresponding two points to the right from the yellow and use the yellow-orange. As the violet inclines toward the blue, the yellow must incline toward the red in order to preserve a proper balance. If, on the other hand, the violet inclined toward the red, the yellow would incline toward the blue in the same proportion.

Then too, the complementary colors are directly opposite each other in value, or the amount of light they contain. As will be seen by the accompanying diagram (Fig. 24) yellow is the brightest color, followed by orange, green, red, blue and violet, the latter being the darker color or the one nearest to black. Thus we see that in a complementary harmony — or harmony of contrast — the lightest color, yellow, is used with the darkest color, violet, the orange is used with blue and the red with green. The color-wheel shown in Fig. 23 is arranged in such manner that the yellow is at the top and the violet at the bottom, thus being in keeping with the proper values of the colors.

We see by consulting our color-wheel that blue and orange form a complementary harmony. The next question is as to the proportions of these two colors which we must use in order to secure a pleasing result. While they may be used in equal proportions in some cases, in printing we usually find that greater satisfaction is gained by the use of a large proportion of one color with a small proportion of the other — and the large proportion must be of the colder color. The printed page must be kept cold in tone. Therefore we use a large amount of blue with a small amount of orange, a large amount of violet with a small amount of yellow, and a large amount of green with a small amount of red — the green, blue and violet being, as before stated, cold colors, while the red, orange and yellow are warm colors. A small spot of one of the warmer colors is sufficient to brighten up a page. Then, too, the eye overestimates the warm colors.

Complementary colors intensify each other. In other words, any color will appear stronger and

brighter if placed close to, or surrounded by, its complement. For example, a spot of red will look brighter and more attractive if placed on a background of green than under any other circumstances. This fact

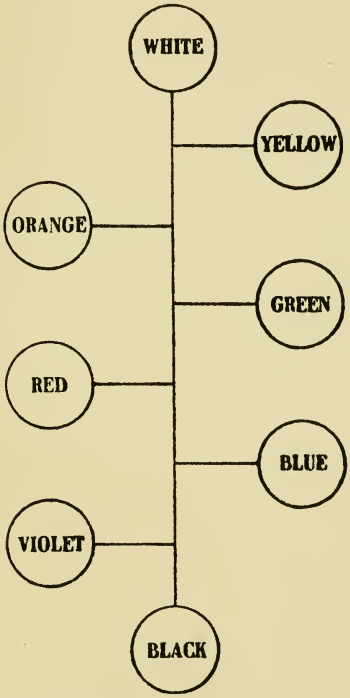


Fig. 24.— Diagram showing the values of the colors — the amount of light which they contain.

must be taken into consideration by the printer if he wishes to secure pleasing results, for no matter how excellent may be the quality of the inks he uses, if they are not combined properly their effect will be deadened. The same ink which looks dull and unattractive in some combinations will brighten up and appear beautiful if properly surrounded by its complement. The printers who turn out the fine color-work have no mysterious color secrets — they merely study and apply the simple principles of color harmony.

We have seen that color harmony may be secured by the use of complementary colors. But a still more pleasing harmony may be obtained by the use of the shade of a color with a tint of its complement. For instance, if instead of using red-violet and yellow-green we use a shade of the red-violet with a tint of the yellow-green, a much more satisfactory result will be obtained. And in this connection it must be remembered that a shade of a color is that color mixed with black, giving the effect of shadow, while a tint of a color is that color mixed with white.

Then for a three-color combination we may use a shade and tint of a color with its complement — for example, light blue and dark blue with orange. This gives a very pleasing result.

This question of complementary harmony, or the harmony of contrasts, is of great value to the printer when using colored stock, such as cover-papers, etc. The stock may be treated as one of the colors of a complementary harmony and the ink may be of a color complementary to the color of the stock. For instance, supposing the stock to be brown (and in this connection it must be remembered that brown is practically always either a red, orange or yellow hue, being usually

a shade of one of these colors), we would decide whether the red, orange or yellow prevailed in the brown and then use the complement of the prevailing color. If an orange-brown, we would use blue as the contrasting color; if a red-brown, we would use green, and if a yellow-brown we would use violet. The use of a shade and a tint of a color with its complement, above referred to, may be taken advantage of in this connection, as for example, a combination of orange and dark blue on light blue stock.

A brief summing up of the foregoing gives us the following:

That the colors which are farthest removed from each other give a pleasing complementary harmony, or harmony of contrast.

That complementary colors are directly opposite each other in value — or the amount of light which they contain.

That if, instead of using equal parts of two complementary colors, we use a small amount of one color with a large amount of the other, a more pleasing result is secured.

That the printed page must be kept cold in tone, and therefore when we use a large proportion of one color with a small proportion of the other, the large proportion must be of the colder color.

That complementary colors intensify each other. In other words, a color appears brighter when it comes in contact with its complement.

That if instead of two complementary colors we use a shade of one of the colors with a tint of the other color, we secure a still more pleasing result.

That excellent three-color combinations are secured by the use of a tint and a shade of a color with its complement — such as light green, dark green and red.

Harmonies of Shades and Tints

In color, as in music, discords result from ignorance of the commonplace rules of harmony.— *The Philosophy of Color.*

ERY effective color combinations are produced by the use of a harmony of a shade and a tint of a color. Combinations of this character result in softer and more subdued effects than do the complementary harmonies. They may be printed on stock of the same hue or a hue of the complementary color — for example, light blue and dark blue on blue-tinted stock, or the same colors on stock of an orange hue. And right at this point let us set ourselves right concerning the hues and the shades of colors — an item frequently misunderstood. As stated before, a shade of a color is that color deepened with black, giving the effect of shadow, while a tint of a color is that color mixed with white, weakening the color. A hue of a color, however, is made by the addition of a quantity of another color. Supposing we take green and blue to illustrate this. By adding a little of the green to the blue we change it from a pure blue to a hue of blue — not a shade of blue, as it is so frequently called. By increasing the proportion of the green our hues of blue gradually become greener until the green predominates, giving, instead of a blue with

a green hue a green with a blue hue. Thus, prussian blue, with which we are all familiar, is not pure blue but a hue of blue, from the fact that it is slightly tinged with green.

Those who make the color-wheel, which is fully described in a previous chapter, will find it of as much value in the use of harmonies of shades and tints as it is in the determining of complementary harmonies. A comparison of the color of the stock selected for a job with the color-wheel will immediately show just what hue of the color is necessary. Supposing that we wish to run a combination of a shade and a tint of blue on blue stock. We compare our stock with the colors on the wheel and find, for instance, that it is of a greenish hue — and select a blue ink of a greenish hue rather than a blue ink of a violet hue. This is an important feature, for the combining of different hues of the same color frequently gives an unpleasant effect.

Then, too, the color-wheel above referred to gives us light in the securing of harmony in the use of black with other colors. Black will, of course, harmonize with any of the colors, but when it is used in combination with one of the cold colors — green, blue and violet — the latter should be of a tint instead of a full color, as otherwise neither of these colors furnishes enough contrast to the black nor brightens up the page sufficiently. In case of the blue and violet, white should, of course, be used in making the tint; but in making a tint of green, to be used in combination with black, greater satisfaction is gained if yellow is used in the place of the white. This gives in reality a tint of yellow-green instead of green, the addition of the yellow — the brightest color — furnishing a more

pleasing contrast to the black. The warm colors — which are also the brightest colors — red, orange, and yellow, may be used with black as full colors. Briefly stated, then, we may roughly divide our color-wheel into two parts, the warm colors on one side and the cold colors on the other, and in selecting colors to work with black we may use the colors on the warm side in their full tones and the colors on the cold side in tints.

In this connection attention may well be called to the use of red and black — probably the colors most frequently used in the production of printed matter. While there are occasions on which the pure red of the spectrum may be combined pleasingly with black, still in the great majority of instances the addition of a little yellow to the red — making a red-orange — will give us a color that is far more satisfactory. This, as in the case of mixing the green tint with yellow instead of white, gives us more brightness and consequently a stronger contrast to the black.

In mixing colors, the lightest color should always be put on the slab first and the darker color added to it. This will save much time and ink, as one will readily discover when he tries, for instance, to make a blue tint by starting with the blue and adding white to it. The amount of white necessary to sufficiently lighten a small particle of color is surprising — as many a pressman who has mixed a tint on this basis and found that by the time it was sufficiently light he had mixed three or four times the amount of ink necessary for the job, can testify. This will bear repetition: Put the light color on the slab first and add the darker color to it in very small quantities. This also holds good in mixing a shade of a color. A very small proportion of

black will darken a color so that it will appear almost black.

Gold will harmonize with all colors except yellow-orange. When used with other colors which harmonize in themselves it does not in any way lessen this harmony; on the other hand, colors which do not in themselves harmonize may be brought into harmony by being separated by gold lines — or, at least, their antagonism neutralized. Care should be taken not to use too much gold, as an excess of gold gives a flashy, unpleasant effect.

The use of colors appropriate to the work in hand is of just as much importance as the use of appropriate type-faces and stock — in many cases it is of more importance. Take, for instance, printing of an ecclesiastical or religious nature. The question of colors as applied to printing of this character is, to a great extent, decided by the custom of centuries. In the early printed books, which were chiefly of a religious nature, space was left for the head and tail pieces and initial letters, which were afterward put in by hand and illuminated in red — or, more strictly speaking, red-orange. In the old hand-lettered ecclesiastical works the lines of lettering were frequently separated by red lines drawn across the page. This established a custom which has been closely adhered to, especially in connection with printing for the Christmas season. For printing for Easter services this custom is frequently departed from, and green and violet are used in the place of the black and red. The question of which colors to use is thus easily disposed of, but the proper distribution of the two colors is quite another matter. As stated before, the chief concern in printing in colors is to keep the bulk of the page in a cold color,

with occasional touches of the warm hue. But here again custom influences our taste and allows a much greater percentage of the red in work of this kind than would be appropriate in commercial work.

No matter how thoroughly appropriate a piece of work may be in all its other details, the charming effect produced by a suggestive color treatment is perhaps the most important of all. The public, although rapidly becoming well versed in what constitutes good printing, knows comparatively little of type-faces, make-ready, etc. To the average person one type-face is as good as another as far as appropriateness for use in connection with any certain subject is concerned. With color, however, it is vastly different. The printer in using color is dealing with a factor about which the layman knows as much — perhaps more — than he himself does. For this reason a discriminating use of color will frequently make a delicate and subtle appeal where the most appropriate type-faces, stock, etc., would have little effect. A recent catalogue devoted to the interests of a certain brand of communion ware is a case in point. The illustrations are of the highest class, the presswork practically perfect and the uncial letter employed in the designs for cover and title page peculiarly appropriate. Yet in this there is nothing to suggest to the average person anything especially harmonious with the subject. Good cuts and good presswork are comparatively common, and as far as the uncial letter is concerned it means no more to him, perhaps, than would any other form of letter. But the color combination on the cover — a handsome yet simple design in light gray-green and silver on a dark gray-green stock, and with one of the pieces of a communion set conventionalized and printed in the silver

as part of the decoration — is something which will appeal to every one. Type-faces, etc., may not mean much in this instance, but the use of the silver forms a direct and unmistakable connection with the subject.

Arrangement of Colors

The influences of color are very largely the result of proportions; the scale of color is low, but the effects are produced by what in music we call expression.— *The Philosophy of Color.*

NOT only from the fact that the cold color should control on the white paper printed page, but also from the necessity of having an arrangement of color pleasing to the eye, the darker color of the combination should be gathered into masses, with the bright color appearing only in spots. The principle (referred to in a previous chapter on the arrangement of type-designs) that too many forces of attraction become confusing to the eye is applicable also in the arrangement of the colors. If, as is so frequently done, we break up our job for colors in such manner that the colors alternate over the entire page, the effect upon the eye is far from satisfactory. The arrangement of the color on the page should be as carefully considered as the arrangement of the type. Just as a few groups or masses of type tend to simplify the type-design, so will a small number of spots of the brighter color simplify the color arrangement. And if possible these spots should be so distributed that they balance on the page, instead of seeming to weigh down one side or the other.

The fundamental colors — red, green and violet —

mentioned in a previous chapter, are used as the basis of the plate-making for three-color printing, the operator sifting these colors out by means of filters or screens of colored glass. In our discussion of color as ordinarily used we take the primary colors — red, yellow and blue — as a basis, for, as before stated, we are dealing with opaque surfaces and reflected light, but in three-color printing we work on the basis of the scientifically correct fundamental colors.

In three-color printing the process consists of making three half-tones from the same original, one through a red (or, more strictly speaking, red-orange) screen, one through a green screen and one through a violet screen. The red-orange screen excludes all but the blue rays, the green screen excludes all but the red rays, and the violet screen excludes all but the yellow rays. Thus we have three plates, one containing or representing the yellow rays that reflect from the subject photographed, one containing the red rays, and one containing the blue rays. The plates are then printed in inks of these colors, which are complementary, or nearly so, to the colors of the screens through which they were made. Thus the plate made through the violet screen is printed in yellow, the plate made through the green screen is printed in red, and the plate made through the red-orange screen is printed in blue, inclining toward blue-green. They are usually printed in the order above named — yellow first, red second, and blue last.

There is noticeable in the printing of to-day a tendency toward a greater use of broken or subdued colors. This is but the natural outcome of education regarding color and its use. As stated before, the uneducated eye sees only the brighter and stronger

colors, while the trained eye perceives the richer and more delicate hues. For instance, in the decorative effects of the savages the primary colors — red, yellow and blue — are used as contrasting colors, and the effect of the combinations of these colors is rather violent. And these combinations are not confined to savages. How frequently we see printed matter on which is found the red and blue combination. In fact it would seem that in many offices as soon as a job is ordered in two colors the first thought is of red and blue. However, the red and blue specimens are gradually giving way to combinations that are less violent. Complementary harmonies — harmonies of contrast between a primary and a secondary color, such as red and green, yellow and violet, and blue and orange — while vastly more pleasing than the combinations of the primary colors, are still rather strong. Combinations of secondary colors — orange and violet, green and violet, and orange and green — frequently afford subdued and more satisfactory effects than do the combinations of primary and secondary colors, while a combination of a secondary and a tertiary color — violet and citron, orange and olive, or green and russet — give still softer and more subdued effects. It is in the use of these broken colors that the printing of some of the older countries — and especially that of Germany — excels.

As printers we do not give enough attention to the proper use of color. We are too prone to think that as long as our type-design is correct and in the latest style or vogue that all else is of practically no importance. This, however, is a great mistake. As before stated, color will make an appeal to people who would not be in the least affected by any style of type or

design. Hence it is necessary that the printer understand color. Even in the larger offices where the printer follows his instructions on the time-ticket in regard to the colors, he must have some understanding of how to properly use them or his work will not be of the best. The man who never gave a thought to what proportion of red he should use in the familiar combination of red and black is all too liable to set up his job in such manner that the proportion of red will be too great. And if this can so easily happen where red and black — so often used that they are frequently called printers' colors — are concerned, how much more liable is he to go astray on the colors with which he comparatively seldom comes in contact.

Just as the art of printing has in recent years undergone vast changes and improvements and is to-day on an entirely different plane than that of a generation or two ago — with all indications pointing to an even greater advancement in the next decade — just so has the meaning of the term "job printer" changed, and will change, for if it does not the printer will find everything but the strictly mechanical parts of the work slipping away from him and going into the hands of artists and designers. To "know the boxes" is but a small part of the knowledge necessary to the job printer of to-day and to-morrow. He must know the principles of design and he must know the theory of color harmony. These things he can learn only by supplementary education, for conditons in the ordinary printing-office do not favor the education of the apprentice along these lines. Study outside of working hours, either independently or with schooling such as the I. T. U. Course in Printing now provides, will alone give this desired information. The possibilities

and growing demand for the finer grades of printed matter should fill the job printer with a desire to make of himself a true craftsman rather than a mere mechanical drudge.

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